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PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

INVENTOR(S)

Given Name (first and middle [if any])	Family Name or Surname	Residence (City and either State or Foreign Country)
Michael Mark A.	Wilford Smith	Chicago, IL Plainfield, IL

☐ *Additional inventors are being named on the* 0 *separately numbered sheets attached hereto*

TITLE OF THE INVENTION (280 characters max)

AIR VENTED LIQUID VALVE

Direct all correspondence to: **CORRESPONDENCE ADDRESS**

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ENCLOSED APPLICATION PARTS *(check all that apply)*

☒ Specification *Number of Pages* 8
☒ Drawing(s) *Number of Sheets* 3
☐ Application Data Sheet. See 37 CFR 1.76
☐ CD(s), Number
☐ Other (specify)

METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT *(check one)*

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The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

☒ No.
☐ Yes, the name of the U.S. Government agency and the Government contract number are: _____

Respectfully submitted,

SIGNATURE Joseph A Fuchs

Date 3/2/2004

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REGISTRATION NO. *(if appropriate)* 34,604

Docket Number: 114063-131

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USE ONLY FOR FILING A PROVISIONAL APPLICATION FOR PATENT

In re U. S. Provisional Application

Inventors:	Michael Wilford and Mark A. Smith
Application No.:	Not yet assigned
Filing Date:	March 2, 2004
For:	AIR VENTED LIQUID VALVE
Attorney Docket No.	114063-131
Enclosures:	PROVISIONAL APPLICATION FOR PATENT COVER SHEET (1 pg. – in duplicate) 8-PAGE SPECIFICATION DRAWINGS (3 sheets, FIGS. 1-7) CHECK NO. 21422 IN THE AMOUNT OF $160; RETURN POSTCARD

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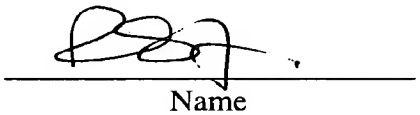


Name

AIR VENTED LIQUID VALVE

CROSS REFERENCE TO RELATED APPLICATIONS

Not applicable.

BACKGROUND OF THE INVENTION

It is known to provide molded plastic taps for use with containers, in particular disposable containers of the type popular for supplying liquid such as water, wine or milk. One well known type of tap for this purpose is a so-called push button tap having a resilient plastic diaphragm which, when pressed, opens the valve to allow liquid to flow from the container. The resilient plastic diaphragm, commonly referred to as a "push button," can be arranged so that it positively urges the valve into a sealing position when manual pressure is removed therefrom. The tap is therefore self-closing.

An alternative to push button taps are the so-called "rotary" taps. In these, a cap is rotated to in turn rotate a stem within the tap body. Rotation of the stem causes it to uncover an aperture provided in the tap body through which or from which liquid is dispensed.

Irrespective of the type of tap used with a container, it has been found that smooth liquid flow with a stabilized flow profile can only be achieved if either the container is flexible and collapses as liquid is dispensed or the container is vented. The reason for this is that otherwise air must flow into the container to fill the space from which liquid has been vacated and equalize the pressure within the container. The inflow of air disrupts the outflow of liquid causing it to be uneven and reducing the flow rate.

SUMMARY OF THE INVENTION

Disclosed herein is an air-vented closure assembly for a fluid container. The closure assembly has a valve body having a docking member for attaching the assembly to the container, a mounting sleeve, and a flange connecting the mounting sleeve to the docking member. The mounting sleeve defines a fluid channel and has an axis. The mounting sleeve also has a fluid spout at one end of the mounting sleeve, the flange having a first fluid conduit with a first fluid outlet and a second fluid conduit with a first fluid inlet connecting the docking member with the fluid channel. A valve member is positioned in the fluid channel

and is mounted for reciprocating movement along the axis in response to rotation of the valve member about the axis. The valve member is moveable from a closed position where the valve member blocks fluid flow through at least one of the first fluid outlet and first fluid inlet and a second position where fluid can flow through the first fluid outlet and the first fluid inlet.

Also disclosed herein is a fluid container having an air vented closure assembly attached thereto.

BRIEF DESCRIPTION OF THE FIGURES

FIG. 1 is an isometric view of a closure assembly of the present invention;

FIG. 2 is an end view of a closure assembly;

FIG. 3 is a side view in partial cross-section of the closure assembly;

FIG. 4 is a plan view in cross-section of the closure assembly taken along line X-X of FIG. 3;

FIG. 5 is a fluid container with the closure assembly;

FIG. 6 is a side view in partial cross-section of the closure assembly in a closed position; and

FIG. 7 is a side view in partial cross-section of the closure assembly in an open position.

DETAILED DESCRIPTION OF THE INVENTION

It should be understood that various changes and modifications to the presently preferred embodiments described herein will be apparent to those skilled in the art. Such changes and modifications can be made without departing from the spirit and scope of the present invention and without diminishing its intended advantages. It is therefore intended that such changes and modifications be covered by the appended claims.

FIG. 1 shows a closure assembly **10** having a valve body **12** and a valve member **14**. The valve body **12** has a docking member **16** an annular flange **18** and a mounting sleeve **20**. The docking member **16** is for connecting the assembly **10** to a container **22** (FIG. 5). The annular flange **18** defines a first fluid conduit **24** and a second fluid conduit **26**. The mounting sleeve **20** defines a fluid channel **28** having an axis **30**. The fluid channel **28** is dimensioned to coaxially receive the valve member **14**. As will be described in greater detail herein, the valve member **14** is moveable from a closed position to an open position to allow

liquid to flow outward from the container through the first fluid conduit **24** while air flows into the container through the second fluid conduit **26**.

The valve body **12** is preferably made from a polymeric material and is manufactured by a polymer processing technique, and, in a preferred form, is manufactured by injection molding. The first fluid conduit **24** and the second fluid conduit **26** are separated by a wall **32**. The wall **24** divides an internal pathway of the annular flange **18** into conduits having different volumes. The volume of the second conduit **26** is greater than the volume of the first conduit. In a preferred form of the invention, the volume of the first conduit has a ratio with respect to the second conduit of from about 0.3-4.0 and more preferably from 0.5-3.0. The first conduit **24** has a fluid inlet end 40 and a fluid outlet **42**. The second conduit **26** has an air inlet **44** and an air outlet **46**.

The mounting sleeve **20** has a generally cylindrically shaped wall having a first end **50**, a second end **52** and an outer surface **54**. A pair of circumferentially spaced, spiral shaped grooves **56** extend from an intermediate portion of the mounting sleeve to proximate the first end **50**. The groove has a top edge **58** and a bottom edge **60** and top stop **62** and a bottom stop **64**. A protuberance **66** extends from the top edge **60** proximate the bottom stop **64**. A gap **68** separates the protuberance **66** from the bottom stop **64**. The second end **52** of the sleeve **20** has a spout **68** having a taper **70** defining a reduced diameter portion when compared to the diameter of the remainder of the sleeve **20**.

The valve element **14** has a first end **80** and a second end **82**. The valve element is generally cylindrically shaped having an outer surface **84**, a gripping projection **86** at the first end **80** and a pair of circumferentially spaced pins **88**. The pins **88** fit within the grooves **56** of the valve body. Rotation of the valve element **14** about the axis **30** causes reciprocating movement of the valve element **14** along the axis **30**. FIG. 6 shows the valve element **14** in the closed position and FIG. 7 shows the valve element in an open position. The protuberance **88** holds the valve element in the closed position to prevent inadvertent dispensing. A force that can be generated by hand is sufficient to overcome the resistance of the protuberance to rotation of the valve element **14**.

The valve element **14** has a portion of its outer surface **84** removed to define a fluid outlet **90** in fluid communication with fluid conduit **26**. The fluid outlet **90** is in alignment with the air inlet **44** when the valve element **14** is in the open position and is not in alignment when the valve element **14** is in a closed position. The fluid conduit **26** has a fluid inlet **92** on

an end opposite the fluid outlet **90**. The fluid inlet **92** is open to ambient air. It is contemplated closing the fluid inlet **92** with a valve, such as a flapper valve, which would open when the valve element is in the open position.

FIG. 5 shows the assembly **10** mounted to a container **22**. The container can be made from polymeric materials, paperboard, or metal. In a preferred form, the container is a polymeric material shaped into a container by any suitable polymer processing techniques such as injection molding, blow molding, by sealing sheets of material together to define a container or other suitable process. Suitable polymers include, but are not limited to, homopolymers and copolymers of polyolefins, polyamides, polyesters or other suitable material. One particularly suitable material is a homopolymer of ethylene and more preferably one having a density of greater than about 0.915 g/cc. In another embodiment, the material is an HDPE. In a preferred container, the sidewalls will have a modulus of elasticity of greater than 20,000 psi. In another preferred form of the container, the sidewalls of the container will not substantially collapse upon draining the contents of the container.

To use the container 22 and closure assembly **10** of FIG. 5, one starts with the container **22** having a fluid content. Starting with the valve element **14** in the closed position (FIG. 6) no fluid can flow from the container. The second end of the valve element **82** blocks the fluid outlet **24**. Upon rotation of the valve element **14** about the axis **30** the pins **88** rotate within the grooves **56** past the protuberance until the pins reach the stop **62**. In this position the fluid outlet **90** is in alignment with the air inlet **44**. Also, in the open position, a gap **92** (FIG. 7) exists between the second end **82** of the valve element and the fluid outlet **42**. Fluid from the container is free to flow through the fluid inlet **40**, through conduit **24**, through the fluid outlet **42**, through the gap **92**, through the second end of the valve body and finally through the spout **68**.

While specific embodiments have been illustrated and described, numerous modifications come to mind without departing from the spirit of the invention and the scope of protection is only limited by the scope of the accompanying claims.

CLAIMS

The invention is claimed as follows:

1. An air-vented closure assembly for a fluid container comprising:

a valve body having a docking member for attaching the assembly to the container, a mounting sleeve, and a flange connecting the mounting sleeve to the docking member, the mounting sleeve defining a fluid channel and having an axis, the mounting sleeve having a fluid spout at one end of the mounting sleeve, the flange having a first fluid conduit with a first fluid outlet and a second fluid conduit with a first fluid inlet connecting the docking member with the fluid channel; and

a valve member positioned in the fluid channel and mounted for reciprocating movement along the axis in response to rotation of the valve member about the axis, the valve member being moveable from a closed position where the valve member blocks fluid flow through at least one of the first fluid outlet and first fluid inlet and a second position where fluid can flow through the first fluid outlet and the first fluid inlet.

2. The assembly of claim 1 wherein the valve member has a generally cylindrically shaped wall defining a third fluid conduit having a second fluid inlet.

3. The assembly of claim 2 wherein the wall has a portion removed to define a second fluid outlet of the third fluid conduit.

4. The assembly of claim 3 wherein when the valve body is in the closed position the wall blocks fluid flow through both the first outlet and the first inlet and when the valve body is in the open position a gap is formed between a distal portion of the wall and the first outlet to allow fluid to flow through the first conduit through the gap and into the fluid channel of the valve body an outward therefrom through the spout and the second outlet is in at least partial alignment with the first inlet to allow fluid to flow through the second inlet into the third conduit and into the first inlet of the second conduit.

5. The assembly of claim 4 wherein when the valve body is in the open position the second inlet is in alignment with a third inlet on the valve member.

6. The assembly of claim 5 wherein the spout is on an opposite end of the sleeve from the third inlet.

7. The assembly of claim 6 wherein the spout is in fluid communication with the first conduit when the valve body is in the open position.

8. The assembly of claim 1 wherein the sleeve has a portion removed to define a first spirally extending groove.

9. The assembly of claim 8 wherein the valve body has a first peg extending from the wall and is mounted in the first groove.

10. The assembly of claim 8 further comprising a second spirally extending groove on the sleeve circumferentially spaced from the first groove and a second peg on the wall is mounted in the second groove.

11. The assembly of claim 9 wherein when the valve body is in the closed position the first peg is positioned at a first end of the first groove and when the valve body is in the open position the first peg is in a second end of the first groove.

12. The assembly of claim 11 wherein the first groove has a protuberance proximate the first end which engages the first peg when the valve body is in the closed position.

13. The assembly of claim 6 wherein the spout has an inner surface having a first taper portion defining a first reduced inner diameter portion.

14. The assembly of claim 13 wherein the valve body has an outer surface having a second taper portion defining a second reduced outer diameter portion, the second taper portion being concentrically positioned within the first taper portion when the valve body is in the closed position.

15. A fluid container comprising:

a sidewall defining a fluid chamber;

a closure assembly on the sidewall and in fluid communication with the fluid chamber, the closure assembly having a valve body having a docking member attaching the assembly to the container, a mounting sleeve, and a flange connecting the mounting sleeve to the docking member, the mounting sleeve defining a fluid channel and having an axis, the mounting sleeve having a fluid spout at one end of the mounting sleeve, the flange having a

first fluid conduit with a first fluid outlet and a second fluid conduit with a first fluid inlet connecting the docking member with the fluid channel; and

a valve member positioned in the fluid channel and mounted for reciprocating movement along the axis in response to rotation of the valve member about the axis, the valve member being moveable from a closed position where the valve member blocks fluid flow through at least one of the first fluid outlet and first fluid inlet and a second position where fluid can flow through the first fluid outlet and the first fluid inlet.

16. The container of claim 15 wherein the sidewalls do not substantially collapse upon draining of its fluid contents.

17. The container of claim 15 wherein the sidewalls have a modulus of elasticity greater than 20,000 psi.

18. The container of claim 15 wherein the first fluid conduit conveys outside the container and the second fluid conduit conveys fluid inside the container.

19. The container of claim 15 wherein the first fluid conduit conveys liquid from the container and the second conduit conveys air into the container.

20. The container of claim 19 wherein liquid flowing from the container through the spout displays Laminar flow.

21. The container of claim 19 wherein the liquid flowing from the container through the spout is essentially free of turbulence upon exiting the spout.

ABSTRACT OF THE DISCLOSURE

Disclosed herein is an air-vented closure assembly for a fluid container. The closure assembly has a valve body having a docking member for attaching the assembly to the container, a mounting sleeve, and a flange connecting the mounting sleeve to the docking member. The mounting sleeve defines a fluid channel and has an axis. The mounting sleeve also has a fluid spout at one end of the mounting sleeve, the flange having a first fluid conduit with a first fluid outlet and a second fluid conduit with a first fluid inlet connecting the docking member with the fluid channel. A valve member is positioned in the fluid channel and is mounted for reciprocating movement along the axis in response to rotation of the valve member about the axis. The valve member is moveable from a closed position where the valve member blocks fluid flow through at least one of the first fluid outlet and first fluid inlet and a second position where fluid can flow through the first fluid outlet and the first fluid inlet.

FIG. 3

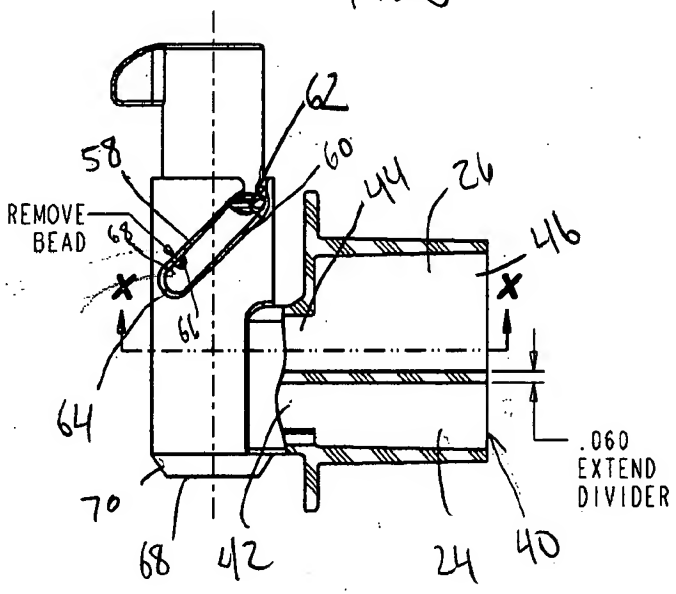


FIG. 2

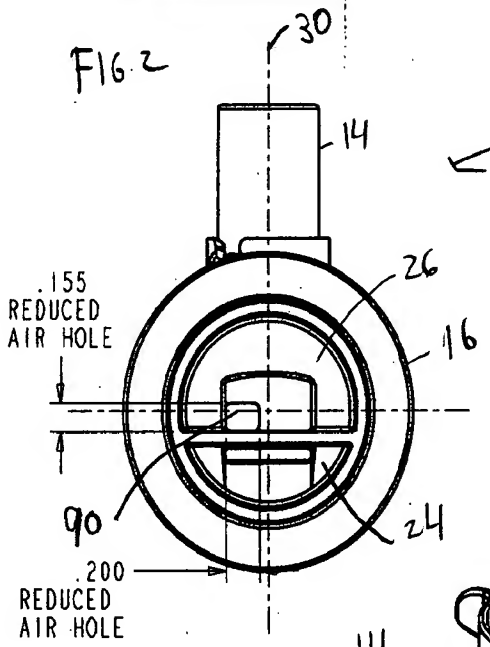
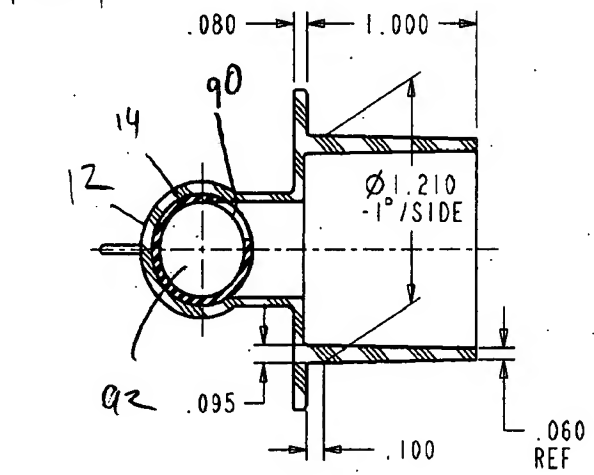


FIG. 4



SECTION X-X

FIG. 5

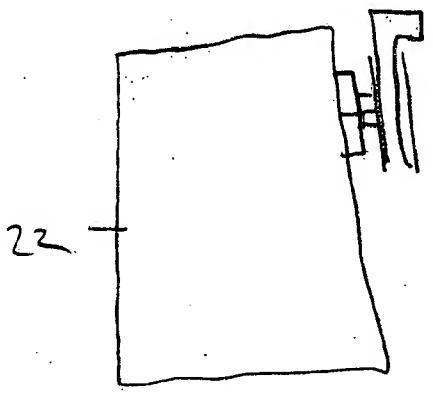


FIG. 1

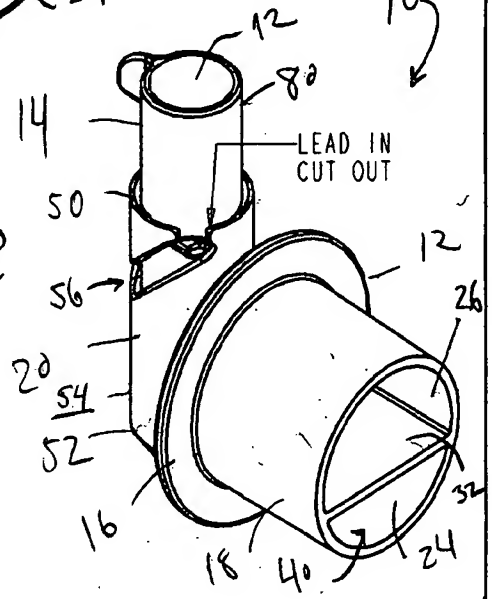


FIG 6

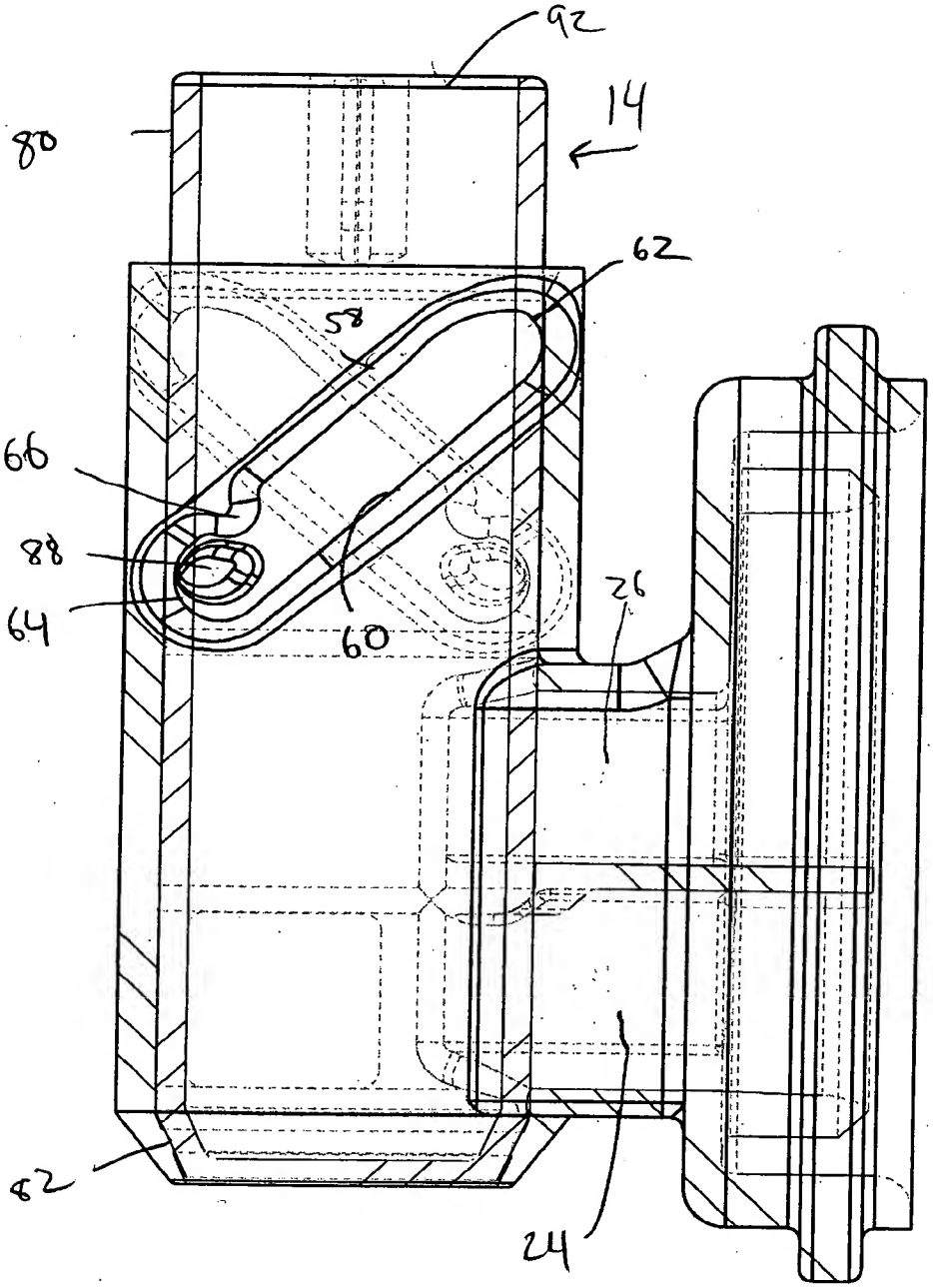


FIG 7